

Claims

1. A method of magnetic resonance imaging of a sample, said method comprising:
 - 5 i) administering a hyperpolarised MR imaging agent comprising non-zero nuclear spin nuclei into said sample;
 - ii) exposing said sample to a radiation at a frequency selected to excite nuclear spin transitions in said non-zero nuclear spin nuclei;
 - 10 iii) detecting MR signals from said sample and utilising spectral-spatial excitation, in combination with line scanning, point scanning and/or steady state imaging techniques; and
 - 15 iv) optionally generating an image, physiological data or metabolic data from said detected signals.
2. The method as claimed in claim 1 wherein step iii) is carried out after the agent has left the vascular bed.
- 20 3. The method as claimed in claim 1 or 2 wherein for steady state imaging a fully balanced version of gradient sequences is used.
- 25 4. The method as claimed in any of the claims 1 to 3 wherein for steady state imaging FISP or PSIF pulse sequences with high flip angles are used.
- 30 5. The method as claimed in any of the claims 1 to 4 wherein said non-zero nuclear spin nuclei are selected from the group consisting of ^1H , ^3He , ^3Li , ^{13}C , ^{15}N , ^{19}F , ^{29}Si , ^{31}P and ^{129}Xe .
- 35 6. The method as claimed in any of the claims 1 to 5 wherein said non-zero nuclear spin nuclei are selected from the group consisting of ^{13}C and ^{15}N , especially ^{13}C nuclei.

7. The method as claimed in any one of the claims 1 to 6 wherein said MR imaging agent is artificially enriched with nuclei having a T₁ relaxation time of more than 5s.

5 8. The method as claimed in claim 6 wherein the MR imaging agent has an effective nuclei ¹³C polarisation of more than 1%.

10 9. The method as claimed in claim 6 wherein the MR imaging agent is ¹³C enriched at carbonyl or quaternary carbon positions.

15 10. The method as claimed in claim 9 wherein said ¹³C enriched compound is deuterium labelled adjacent said ¹³C nucleus.

11. The method as claimed in any one of claims 6 to 10 wherein said ¹³C nuclei are surrounded by one or more non-MR active nuclei or entities selected from the group consisting of O, S, C or a double or triple bond.

12. The method as claimed in any of the claims 1 to 11 wherein step iii) utilises spectral-spatial excitation combined with a steady state imaging technique.

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13. The method as claimed in any of the claims 1 to 12 wherein said imaging agent comprises a compound selected from the following:

